ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5462

The influence of abiotic factors on the swimming ability of hatchery-reared and wild juvenile pink salmon

V. E. Kaeva

Original title: Vliyanie abioticheskikh faktorov na plavatel'nuyu sposobnost' zavodskoi i dikoi molodi gorbushi

Source: Presented at the Meeting of Soviet and Canadian Scientists on Joint Research in the North Pacific, Khabarovsk, U.S.S.R., 1988, 2 p.

Original language: Russian

Available from:
Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1989

3 typescript pages

Secretary of State | Secrétariat d'État

90-00602/

MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU | BUREAU DES TRADUCTIONS

Client's No.–N° du client	Department – Ministère	Division/Branch – Division/Direction	City – Ville
0551	DFO	Scientific Publications	Ottawa
Bureau No.–N° du bureau	**Language – Langue**	**Translator (Initials) – Traducteur (Initiales)**	
3511501-04	Russian	B.P.	JUN 19 1989

VLIYANIE ABIOTICHESKIKH FAKTOROV NA PLAVATEL'NUYU SPOSOBNOST' ZAVODSKOI I DIKOI MOLODI GORBUSHI

THE INFLUENCE OF ABIOTIC FACTORS ON THE SWIMMING ABILITY OF HATCHERY-REARED AND WILD JUVENILE PINK SALMON

By V.E. Kaeva

Under natural conditions the eggs and larvae of pink salmon develop at the bottom and before the start of downstream migration they are protected against the direct effect of the water stream, light, noise, and predators. At fish-rearing stations, the embryo-larval period in the development of pink salmon takes place in the horizontal stream of water where the speed of flow is 1.5-2 times higher than at the spawning redds, the lighting is 20-50 times stronger, and the population density reaches 40000 individuals per square meter. The above-mentioned factors favor the development in hatchery-reared specimens of a positive light taxis, some differing morphological traits, and an earlier start of active swimming.

In our experiment we studied the swimming ability of 400 hatchery-reared fingerlings (the Lesnoi fish-rearing station) and 350 naturally spawned downstream-migrants (the Ochepukha River). The swimming ability was evaluated from the swimming time of young fish in a flow of 0.369 meters per second created in a hydrodynamic trough. As soon as the stopwatch was started, one or two fingerlings were released in the trough and their bahavior was observed until they were carried to the grille barrier. During the test, the bahavior of the specimens caught at spawning grounds differed substantially from that of the hatchery-reared specimens. The wild juvenile fish instantly oriented themselves in the flow and resisted it with apparent ease. They were easily frightened, reacted to the shadow of a hand, and would quickly leave the lighted

zone (temporarily created to determine the reaction) and seek the darkest one. The hatchery-reared juvenile fish, when placed in the flow, would /2 move chaotically in jerks for 20-60 seconds and then start swimming after a certain time of adaptation. They did not react to changes in lighting or to the predator fishes released in the trough, trying to hide behind them to escape the action of the flow. The average time during which the wild specimens remained in the flow was 42.3 minutes (with an individual variation from 2 to 169 minutes), whereas for hatchery larvae of various lots this time was 4.9, 5.3 and 11.2 minutes (with an individual variation from 20 seconds to 32 minutes).

Definite differences were recorded between the hardy wild juvenile fishes and the rapidly tiring hatchery-reared specimens in the maximum and minimum body height (also observed between specimens with high and low swimming ability of the same origin), the length of the dorsal fin base, the length of pectoral fins and of caudal peduncle. The values of the three last traits were higher in hatchery-reared fingerlings. Apparently, the rigidly oriented horizontal flow to which the juvenile fish are subjected at the hatchery during 3-5 months may be one of the reasons favoring a more intense development of the pectoral fins and of the caudal peduncle. Moreover, the hatchery larvae are lying at the bottom several layers thick under conditions that are far from identical. Thus, the specimens of the lower layer hide in the scattered pebbles on the bottom to avoid the flow. The larvae of the upper layer develop under the influence of the flow expending their energy to overcome it. Such imperfections of the existing biotechnology result in high morphological heterogeneity of the juvenile fish and, probably, in the development of different swimming ability.

Larger specimens of downstream-migrants, as a rule, displayed a better swimming ability. On the average, the physical stamina of the hatchery-reared specimens was seven times lower than that of the wild individuals.